RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

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CCARDESA
Centre for Coordination of Agricultural Research and Development for Southern Africa

SADC Futures
Developing Foresight Capacity for Climate Resilient Agricultural Development

Historical Analysis of Climate Change and Agriculture Events in the SADC Region 1970 - 2020

Citation:
Chesterman S, Neely CN, Gosling A. 2020. Historical Analysis of Climate Change and Agriculture Events in the SADC Region 1970 - 2020. SADC Futures: Developing Foresight Capacity for Climate Resilient Agricultural Development Knowledge Series. CCAFS Report. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org

Published by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic partnership of CGIAR and Future Earth, led by the International Center for Tropical Agriculture (CIAT). The Program is carried out with funding by CGIAR Fund Donors, Australia (ACIAR), Ireland (Irish Aid), Netherlands (Ministry of Foreign Affairs), New Zealand Ministry of Foreign Affairs & Trade; Switzerland (SDC); Thailand; The UK Government (UK Aid); USA (USAID); The European Union (EU); and with technical support from The International Fund for Agricultural Development (IFAD).

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Cover Photo: Christine Sandu-unsplash

ABOUT THE SADC FUTURES PROJECT

In these highly uncertain and rapidly changing times, the SADC region, like many regions in Africa, remains fundamentally dependent on a resilient agricultural system and natural resource base. Climate change still poses the greatest threat to the agricultural system and therefore technical capacity is needed to address these future impacts and adapt plans, policies and programs. Taking into account alternative futures, the SADC Futures project has produced tailored supporting materials and documents as part of a wider approach for foresight training in the region. These documents and the associated foresight framework aim to equip users to practically apply the range of foresight tools and methods for innovative strategic planning and policy formulation for climate resilience.

This SADC Futures Project is a joint initiative of the SADC Secretariat's Food, Agriculture and Natural Resources (FANR) Directorate, the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), the International Livestock Research Institute (ILRI) through the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and German Development Cooperation facilitated through the SADC / Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH 'Adaptation to Climate Change in Rural Areas' program (ACCRA), funded by the German Federal Ministry for Economic Cooperation and Development (BMZ).

SADC FUTURES FORESIGHT FRAMEWORK

Input
Understanding our context

Analysis
What is happening?

Interpretation
Why is it happening?

Plan
What do we want to experience in the future? What might get in our way? What might we do to get there?

Prospection
What might happen that we have not thought about?

Reflection
What might we want to do differently?

Strategy
What will we do differently?

Data, evidence, knowledge and creativity

Stakeholder engagement and participation

INPUT

Context

- Scope
- Theme or key topic
- Geopolitical boundary
- Structures & policies
- Timeline
- Stakeholder Mapping

ANALYSIS

What is happening?

- Trend Analysis
- Horizon Scanning
- Evidence

INTERPRETATION

Why is it happening?

- Systems Mapping
- Cross sectoral and multi-stakeholder approaches

PLAN

What do we want to experience in the future? What might get in our way?

What might we do to get there?

- Visioning
- Causal Analysis
- Stakeholder Analysis
- Backcasting
- Pathway Development & Trade-offs

PROSPECTION

What might happen that we have not thought about?

- Developing Scenarios
- Identify drivers and critical uncertainties
- Develop plausible future scenarios

REFLECTION

What might we want to do differently?

- Scenario Implications
- Transformation Elements
- Transformational Change

STRATEGY

What will we do differently?

- Transforming Climate Resilient Pathways

SADC Futures
Developing Foresight Capacity for Climate Resilient Agricultural Development

ABOUT THE SADC FUTURES KNOWLEDGE SERIES

To expand on the foresight and futures capacity building the project has produced a series of accompanying knowledge products and sources. The knowledge series mapped to the SADC Futures foresight framework is shown below.

These can all be found on the SADC Futures webpage https://bit.ly/SADCFuturesForesight.

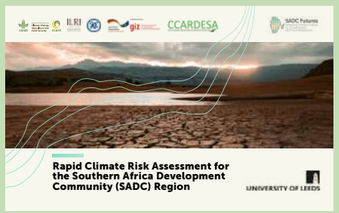
INPUT

Structures, Policies and Stakeholder Landscape Relevant to Climate Change and Agriculture in the SADC Region

ANALYSIS

Historical Analysis of Climate Change and Agriculture Related Events in SADC

Mega-trends in the Southern African Region



Rapid Climate Risk Assessment for the Southern Africa Development Community (SADC) Region

INTERPRETATION

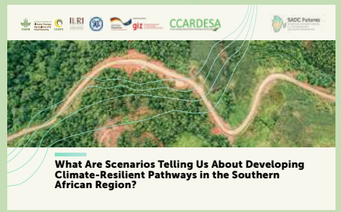
Systems Analysis and Sectoral Linkages Impacting Climate Resilient Development in the SADC Region

PLAN

Climate Resilient Development Pathways

SADC Futures Foresight Training Toolkit

PROSPECTION



What Are Scenarios Telling Us About Developing Climate-Resilient Pathways in the Southern African Region?

REFLECTION

STRATEGY

Applying Foresight For Enhanced Climate Resilience and Agriculture Policy Development in the SADC Region

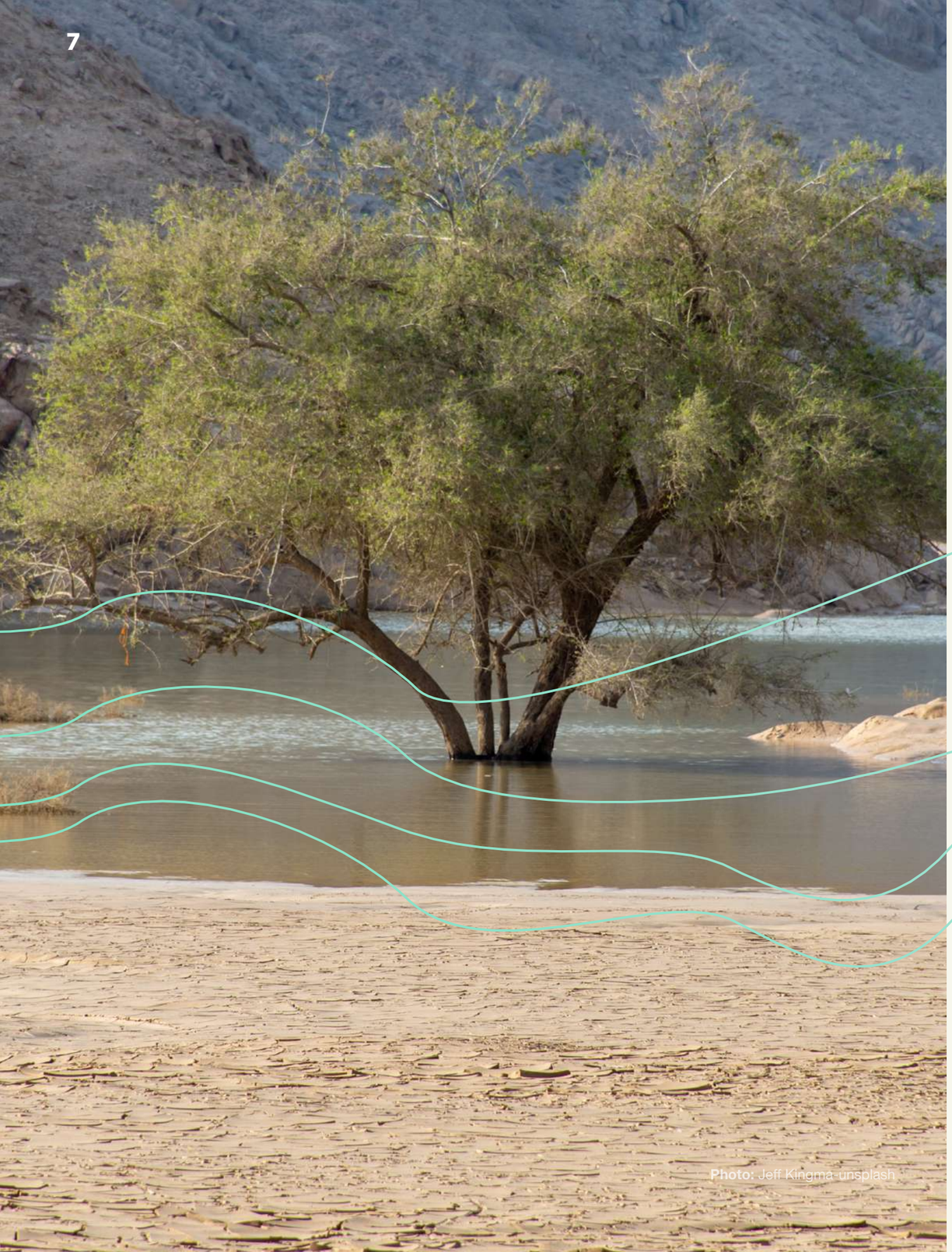


Photo: Jeff Kingma unsplash

CONTENTS

HISTORICAL ANALYSIS FOR FORESIGHT PLANNING

Historical analysis in foresight planning involves looking at what has happened over a relevant, prescribed timeline to try to understand why current and future patterns are emerging. This is done by reviewing relevant events, stakeholders involved, processes, and patterns that occur within the chosen historical time frame.

The skills needed for undertaking a historical analysis include the ability to (Schoemaker, 2020):

- **Pose good questions;**
- **Explore evidence;**
- **Connect events;**
- **Discern patterns;**
- **Appreciate broader contexts; and**
- **Respect complex causations.**

Any recent history relevant to the focal issue is assessed for its potential continuation into the future, essentially providing a temporal bridge (Schoemaker, 2020).

For the purposes of this analysis, the historical time frame selected as relevant to the theme of climate resilient agri-food systems in the SADC region is 50 years (1970-2020). The topics chosen for analysis include the external systems or drivers of change likely to impact the future productivity of regional agri-food systems, namely climate change (droughts and flooding), agricultural pests and diseases, human health, trade, political past, and conflict. The timelines show the years that relevant events took place and the magnitudes of their impacts e.g. the number of human lives lost.

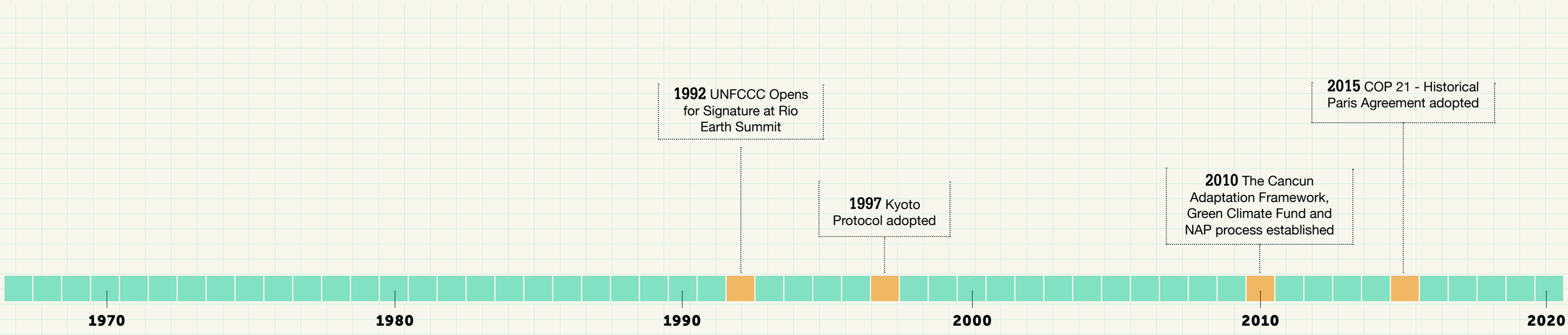
Photo: Neil Palmer (CIAT)

Photo: Ollivier Girard (CIFOR)

ACRONYMS AND ABBREVIATIONS

ACCRA	Adaptation to Climate Change in Rural Areas
ACP	African, Caribbean and Pacific
AfCFTA	African Continental Free Trade Agreement
AIDS	Acquired Immunodeficiency Syndrome
BMZ	German Federal Ministry for Economic Cooperation and Development
CAADP	Comprehensive Africa Agriculture Development Program
CAF	Cancun Adaptation Framework
CCAFS	Climate Change, Agriculture and Food Security
CCARDESA	Coordination of Agricultural Research and Development for Southern Africa
CGIAR	Consultative Group for International Agricultural Research
COMESA	Common Market for Eastern and Southern Africa
COVID-19	Coronavirus Disease 2019
DRC	Democratic Republic of Congo
ENSO	El Nino-Southern Oscillation
EPA	Economic Partnership Agreement
EU	European Union
EUS	Epizootic Ulcerative Syndrome
FANR	Food, Agriculture and Natural Resources
FMD	Foot and Mouth Disease
FTA	Free Trade Area
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
ILRI	International Livestock Research Institute
MS	Member State
MVAC	Malawi Vulnerability Assessment Committee
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NEPAD	New Partnership for Africa's Development
PTA	Preferential Trade Area
REC	Regional Economic Community
SADC	Southern African Development Community
SARS	Severe Acute Respiratory Syndrome
TDCA	Trade, Development and Cooperation Agreement
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
UV	Ultraviolet
WTO	World Trade Organisation

UNFCCC agreements



The ultimate objective of all agreements under the United Nations Framework Convention on Climate Change (UNFCCC) is to "stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a time frame which allows ecosystems to adapt naturally and enables sustainable development" (UNFCCC, 2020).

Industrialised nations agree under the Convention to support climate change activities in developing countries by providing financial support for action on climate change as well as by sharing technological advances.

Key UNFCCC Events

June 1992, Rio Earth Summit: UNFCCC opens for signature at the Earth Summit in Rio, bringing the world together to curb greenhouse gas emissions and adapt to climate change. The UNFCCC has two sister Conventions also agreed upon in Rio, the UN Convention on Biological Diversity and the Convention to Combat Desertification (UNFCCC, 2020).

December 1997, Kyoto Protocol: The third Conference of the Parties achieves an historical milestone with adoption of the Kyoto Protocol, the world's first greenhouse gas emissions reduction treaty (UNFCCC, 2020).

December 2010, Cancun: The sixteenth Conference of the Parties results in the Cancun Agreements, a comprehensive package by governments to assist developing nations in dealing with climate change. The Green Climate Fund, the Technology Mechanism and the Cancun Adaptation Framework are established. The national adaptation plan (NAP) process was established under the Cancun Adaptation Framework (CAF) (UNFCCC, 2020).

December 2015, COP 21 - Historical Paris Agreement: 195 nations agreed to combat climate change and to implement actions and investment towards a low-carbon, resilient and sustainable future. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals (UNFCCC, 2020).

FIND OUT MORE:

Cyclones and flooding | Drought | Agricultural pests and diseases | Human health | Trade | Political past, conflict

Trade

1986 Anti-Apartheid Act Economic Sanctions on South Africa

1992 SADC is founded

1993 UN General Assembly lifts sanctions on South Africa

1994 COMESA Free Trade Area is formed

1996 SADC Protocol on Trade

1999 Trade Development and Co-operation Agreement (TDCA) between European Union (EU) and South Africa

2002 African Union (AU) New Partnership for Africa's Development (NEPAD)

2003 Establishment of AU's Comprehensive Africa Agriculture Development Programme (CAADP)

2003 Contonou Agreement with EU

2016 EU-SADC Economic Partnership Agreement (EPA)

2019 African Continental Free Trade Agreement (AfCFTA)

1970 1980 1990 2000 2010 2020

CLICK HERE TO LEARN MORE ON TRADE

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Drought | Agricultural pests and diseases | Human health | Political past, conflict

Photo: Cytonn Photography-unsplash

African Trade Sanctions and Agreements

Comprehensive Anti-Apartheid Act, 1986: This was enacted into law by the US Congress to impose sanctions against South Africa, and focused on preventing new trade and investment between the USA and South Africa, as well as working to end any current economic transactions occurring between the two nations.

Sanctions Against South Africa Lifted, 1993: General Assembly of the United Nations requested states to terminate prohibition or restriction on economic relations with South Africa.

Common Market for Eastern and Southern Africa (COMESA), 1994: COMESA replaced the former Preferential Trade Area (PTA) which had been established in 1981. COMESA's strategy is "economic prosperity through regional integration". The Free Trade Area (FTA) was established in 2000 when nine Member States eliminated their tariffs on COMESA originating products, in accordance with the tariff reduction schedule adopted in 1992 (COMESA, 2019).

SADC Protocol on Trade, 1996: This aims to liberalise intra-regional trade by creating mutually beneficial trade arrangements, thereby improving investment and productivity in the region. It advocates that Member States eliminate barriers to trade, ease customs procedures, harmonise trade policies based on international standards, and prohibit unfair business practices.

Trade, Development and Cooperation Agreement (TDCA), 1999: Signed between the European Community and South Africa, the treaty consisted of a free trade agreement, development aid and several areas of cooperation, such as economic and social cooperation.

Cotonou Agreement, 2003: The treaty was between the European Union (EU) and the African, Caribbean and Pacific (ACP) Group of States, and aimed at the reduction and eventual eradication of poverty whilst contributing to sustainable development and to the gradual integration of ACP countries into the world economy.

EU-SADC Economic Partnership Agreement (EPA), 2016: The EU signed with the SADC EPA Group (comprising Botswana, Lesotho, Mozambique, Namibia, South Africa and Eswatini-Angola has an option to join the agreement in future). The agreement is development-oriented, the EPA gives asymmetric access to the partners in the SADC EPA group and provides improved opportunities for trade in goods by guaranteeing access to the EU market without any duties or quotas (European Commission, 2019).

African Continental Free Trade Agreement (AfCFTA), 2019: The main objectives of the AfCFTA are to create a single continental market for goods and services, with free movement of business persons and investments, and thus pave the way for accelerating the establishment of the Customs Union. It will also expand intra-African trade through better harmonisation and coordination of trade liberalisation and facilitation and instruments across the Regional Economic Communities (RECs) and across Africa in general (TRALAC, 2020). Trading under the agreement is expected to begin in July 2020.

Climate Change and Trade

- **Trade is important for economic growth and development,** consumer needs, poverty reduction and the global economy.
- In Southern Africa, major **constraints to expanding exports** include a lack of financing, lack of production capacity, high costs of transport and a high cost of doing business.

INTERNATIONAL

- **South Africa developed cash crops to export outside of the continent,** mainly to the European Union, which originally granted the country trade preferences under the TDCA agreement of 1999 (Blein et al., 2013). Previously in South Africa (1986-1993), trade and investment was sanctioned to force the disruption of the Apartheid Regime.
- **South Africa presently acts as a trade hub in the region,** with the largest economy: two thirds of total SADC trade is with South Africa (SARDC, 2018).
- In June 2016, a further five SADC states signed an **Economic Partnership Agreement (EPA)** with the European Union for beneficial access to European markets for exports (SADC, 2017).
- **The Contonou agreement, between the ACP countries (including all SADC MSs) and the EU**, expires in 2020. It rules the political, commercial, cooperation and development relations between the two blocs, whose ties began in 1975 with the Lomé agreement.

REGIONAL

- **Agriculture in Africa is largely focused on national markets**. However, the regionalisation and integration of markets is crucial for stabilising prices and securing domestic market supply (Blein et al, 2013).
- In 2017, **intra-SADC trade remained low at 15-17%** (SADC, 2017).
- **Intra-African agricultural trade is still underexploited due to high import tariffs** and other non-tariff barriers such as transport infrastructure, communication and market information, health and safety standards, low productivity and a lack of rural connectivity.
- **The SADC Industrialisation Strategy and Roadmap 2015-2063,** aims to increase intra-SADC regional and international trade to enhance GDPs, create more employment opportunities and ultimately, reduce poverty in MSs (SADC, 2017).
- **The African Continental Free Trade Agreement (AfCFTA)** entered into force in May 2019. It is the biggest trade agreement signed since the World Trade Organisation (WTO) was established. AfCFTA commits countries to remove tariffs on 90% of goods, progressively liberalise trade in services as well as address other non-tariff barriers such as delays at national borders. Intra-African trade in agricultural products is expected to be between 20% and 30% higher in 2040 with the AfCFTA in place, particularly in sugar, vegetables, fruit, nuts, beverages and dairy products (Biteye and Songwe, 2018).

Agriculture Development Enabling Institutions & Programmes

The main objectives of **SADC** are to achieve development, peace and security, economic growth, to alleviate poverty, enhance the standard and quality of life of the peoples of Southern Africa, support the socially disadvantaged through regional integration, built on democratic principles and equitable and sustainable development.

The New Partnership for Africa's Development (NEPAD) Programme, adopted by the African Union, has four primary objectives: eradicate poverty, promote sustainable growth and development, integrate Africa in the world economy and accelerate the empowerment of women.

The Comprehensive Africa Agriculture Development Programme (CAADP) aims to increase public investment in agriculture by a minimum of 10% of national budgets and to raise agricultural productivity by at least 6%.

Photo: Frank Mckenna-unsplash

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Drought | Agricultural pests and diseases | Human health | Political past, conflict

Cyclones and flooding

1974 mean annual rainfall 100% above average in Southern Africa

1975 Mauritius Cyclone Gervaise
10 3,706

1975 Mozambique flooding of Limpopo and Incomati Rivers

1977 Mozambique flooding of Limpopo River
87

1978 Mozambique flooding of Zambezi River
45 100,000
USD **62** million

1979 Mauritius Cyclone Claudette
5
USD **175** million

1987 Flooding in South Africa and Lesotho
388 68,000

1994 Madagascar Storms Daisy & Geralda
274
356,000
USD **10** million

1994 Mozambique Cyclone Nadya
240
1.5 million
USD **20** million

1997 Madagascar Cyclone Gretelle

2000 Flooding in Mozambique
700 250,000
USD **600** million

2000 Madagascar Storms Eline & Gloria, Eline caused flooding in Limpopo Basin
205 10,000
USD **9** million

2004 Madagascar Cyclone Gafilo
363
USD **250** million

2007 Cyclone Favio hit Madagascar & Mozambique, Zimbabwe also affected
USD **71** million

2007-2008 floods in Malawi, Mozambique, Tanzania, Zambia, Zimbabwe

2010 Madagascar Storm Hubert
85 66,000

2017 Mozambique and Zimbabwe Storm Dineo
271
USD **200** million

2019 Cyclones Idai & Kenneth affects
Mozambique
654 USD **100** million
Zimbabwe
185 USD **622** million

1970 1980 1990 2000 2010 2020

Human Impact
Lives lost

Human Impact
People made homeless

Economic Impact
(Cost USD)

FIND OUT MORE:

UNFCCC agreements | Drought | Agricultural pests and diseases | Human health | Trade | Political past, conflict

Drought

1967 severe drought in most parts of Southern Africa

45 million

1968-1973 drought in most parts of Southern Africa, but high rainfall in DRC

1981-1983 drought in most parts of Southern Africa, particularly Zimbabwe and Mozambique

1986-1987 drought in most parts of Southern Africa

1991-1992
severe drought in Southern Africa

1.3 million

USD **950** million

USD **102** million GDP loss due to electricity shortages (Zimbabwe)

USD **36** million GDP loss in export earnings (Zimbabwe)

1994-1995
worst drought in SADC history Zimbabwe

>5.5 million

1997-1998 drought in most parts of Southern Africa

2001-2003
severe drought in SADC region

2003-2004
severe drought in SADC region

2005-2006
severe drought in SADC region

2010 drought affects Zimbabwe

2015-2016 drought in SADC region, worst in 35 years

39 million

USD **2.9** billion

2018-2020 drought in SADC region

45 million

USD **284** million

1970 1980 1990 2000 2010 2020

CLICK HERE TO LEARN MORE ON THIS TOPIC

Human Impact
Affected

Human Impact
Food insecurity

Human Impact
Food aid

Economic Impact
(Cost USD)

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Agricultural pests and diseases | Human health | Trade | Political past, conflict

Changes in Climate and Extreme Events in Southern Africa

- Increasing evidence suggests that **climate change is contributing to higher temperatures** in Southern Africa, which is exacerbating the impacts of drought and flooding. The frequency of weather and climate related disasters has increased since 1970.

- Climate events account for the **largest percentage** (67%) of natural disaster deaths in the region (Davis-Reddy and Vincent, 2017).

- **Over the period 1980-2015**, SADC experienced 491 recorded climate-disasters that resulted in 110,978 deaths, rendered 2.47 million people homeless and affected an estimated 140 million people (Davis-Reddy and Vincent, 2017).

- **Floods are the most common natural disasters in the region** but droughts have resulted in the highest economic cost and have affected a larger proportion of the region's population.

- Between 1980 and 2015 an estimated **107 million people** (37% of the SADC population) were affected by **drought**, whereas **floods** affected an estimated **21 million people** (7.6% of the SADC population) (Davis-Reddy and Vincent, 2017).

CYCLONES AND FLOODING

- Storms (including tropical cyclones) tend to be responsible for **displacing the most people**, with an estimated 1.7 million people left homeless between 1980 and 2016 (Davis-Reddy and Vincent, 2017).
- **Floods disproportionately affect communities with poor infrastructure and health services** where they often result in a loss of life, damage to property and infrastructure as well as disease e.g. malaria and cholera.

EXAMPLES:

- **In 1987, flooding in South Africa and Lesotho** severely damaged thousands of kilometres of roads, 14 bridges were washed away and all entrance routes to Durban (South Africa) were closed. Approximately 68,000 people were left homeless and 388 people were killed (Davis-Reddy and Vincent, 2017).
- **In 2000, Cyclone Eline caused severe flooding in Mozambique and to a lesser extent in South Africa, Zimbabwe and Botswana**. High winds, torrential rains and high river flows resulted in economic losses and damage to infrastructure, livelihoods and agricultural crops. In Mozambique, around 700 people died and the GDP growth rate dropped from 10% to 2% (Davis-Reddy and Vincent, 2017).
- **In 2019, tropical Cyclone Idai hit Beira in Mozambique and then continued moving across the region**. Millions of people were affected in Malawi, Mozambique and Zimbabwe. Cyclone Idai was the worst natural disaster to hit Southern Africa in around two decades. Six weeks later, **Cyclone Kenneth** made landfall in northern Mozambique. This was the first time where two strong tropical cyclones hit the country in the same season. The damage caused was immense and populations in affected areas required urgent humanitarian assistance in healthcare, nutrition, protection, education, water and sanitation (Unicef, 2019).

Photo: ©TheHumanitarianCoaliton.ca

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Agricultural pests and diseases | Human health | Trade | Political past, conflict

Changes in Climate and Extreme Events in Southern Africa

DROUGHT

- Large areas of Southern Africa are susceptible to **dry conditions** and experience frequent droughts.
- **Severe droughts** (such as those of 1982-1983, 1991-1992, 1997-1998 and 2014-2015) have been linked to the El Niño-Southern Oscillation (ENSO) phenomenon (Davis-Reddy and Vincent, 2017).
- Droughts in Southern Africa are **exacerbated** by land degradation, poor water conservation practices as well as political instability and poor economic growth.
- Furthermore, Southern African economies are **dependent on rain-fed agriculture** and so are more vulnerable to droughts. Droughts often result in decreased agricultural productivity owing to lower crop yields and loss of livestock and ultimately an increase in national and household food insecurity and rise in food prices.
- Droughts are often accompanied by **high temperatures** and an increase in high fire danger days.
- Droughts have additional consequences for **hydropower energy generation**. In 1992, for example, a drought in Zambia resulted in a 35% reduction in hydropower generation compared with the previous year (Davis-Reddy and Vincent, 2017).

EXAMPLES:

- **In 1992, drought** resulted in approximately 70% of crops failing and 11.4 million tonnes of cereal having to be imported to the region. Only 20-70% of mean rainfall amounts were received, with the dry conditions compounded by abnormally high temperatures. Zambia, Malawi, Mozambique and South Africa were the worst affected. Zimbabwe's agricultural production declined by 45%, manufacturing output by 9.3%, and GDP by 11%. Mozambique was particularly vulnerable to the impacts of the drought due to the ongoing civil war, this resulted in more than 1.3 million people being affected by food insecurity. In South Africa, the drought caused a loss of 1.8% of GDP (~USD 500 million). Farm labour was retrenched, farm debt increased, and a number of farms were forced to close (Davis-Reddy and Vincent, 2017).
- **The 1994-1995 drought** resulted in **severe shocks to the production of maize, Zimbabwe's** staple grain. Almost 2 million people nationwide received drought relief in late 1994. This figure had risen to 5.8 million by July 1995, when the cost of the drought relief programme was estimated at Z$ 2 billion. It was projected that half the country's population would require emergency feeding by early 1996, necessitating a food import bill of Z$1.9 billion. It was estimated that at least 934,000 children would need supplementary feeding (Kinsey et al., 1998).
- **In 2015**, the **drought in South Africa** was due to a strong El Niño event. Farms specialising in maize, wheat and sugarcane and beef or sheep production were the worst affected. Most of South Africa's maize (83%), wheat (53%) and sugarcane (73%) are produced under dryland conditions and so are highly susceptible to drought. Lesotho, Swaziland, Zambia and Zimbabwe also experienced lower crop yields and surges in maize prices (Davis-Reddy and Vincent, 2017).
- **The 2015-2016 drought in the SADC region** was rated the worst in 35 years. Six countries declared national drought disasters. The drought caused a humanitarian crisis affecting 39 million people. The regional cereal deficit was close to 7.4 metric tonnes. A Humanitarian Appeal for USD 2.9 billion was made (SADC, 2016).

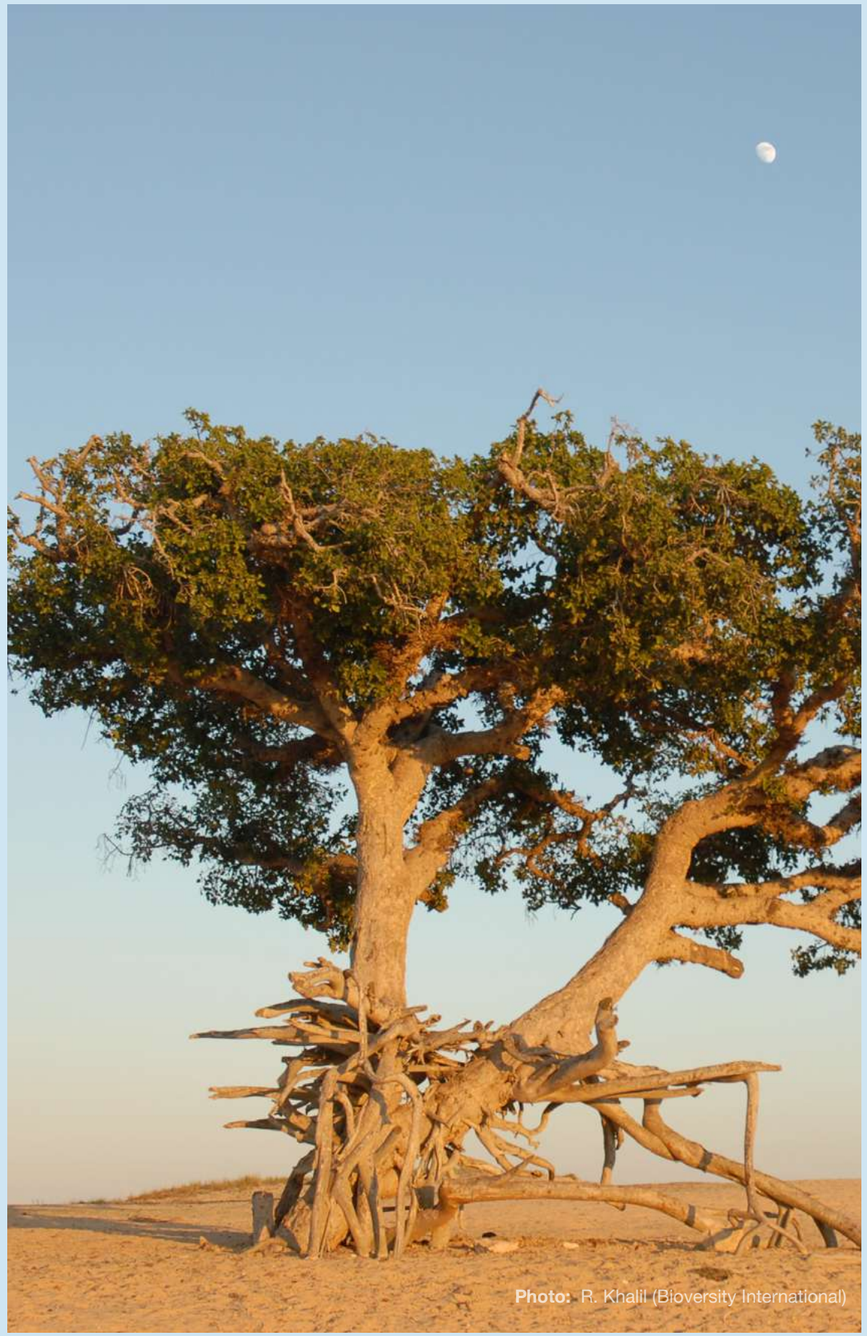
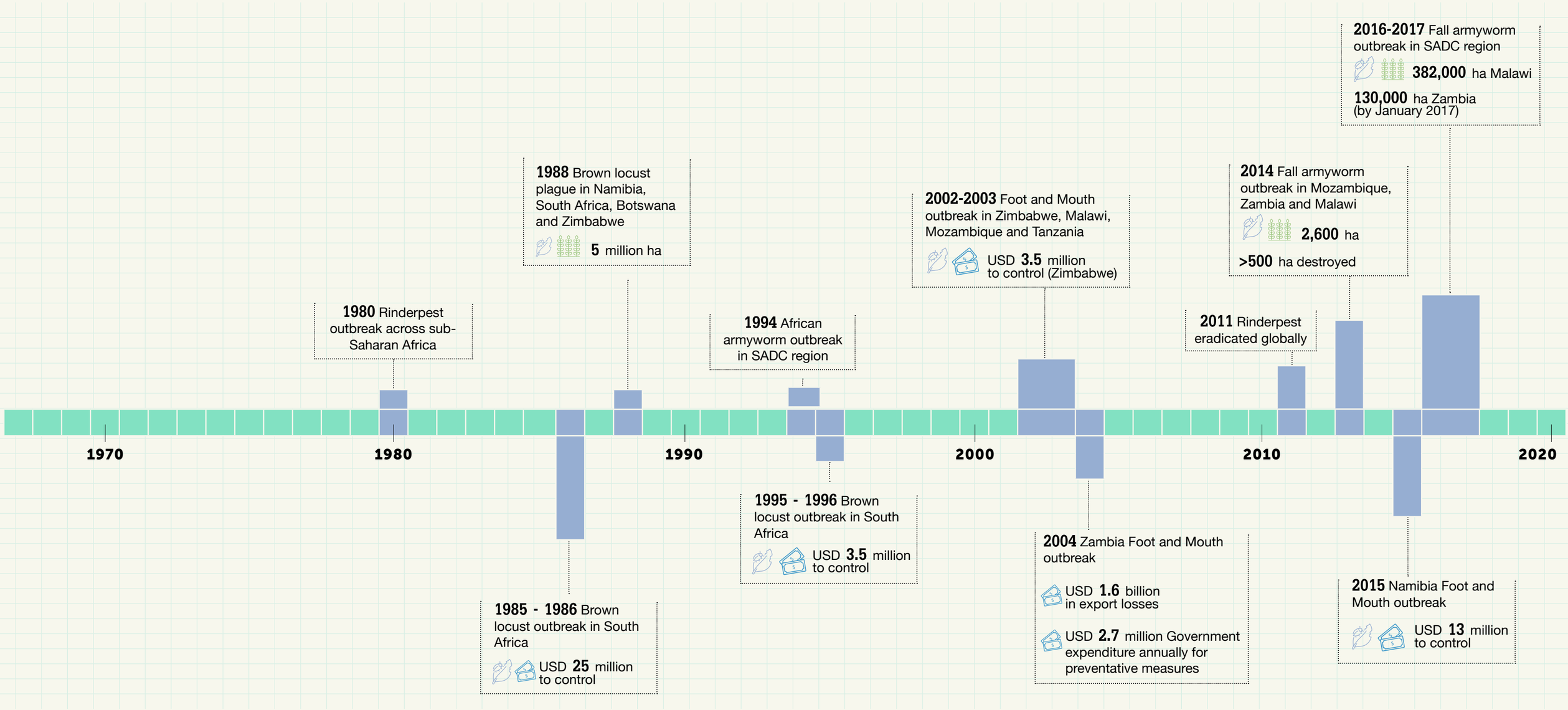


Photo: R. Khalil (Bioversity International)

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Agricultural pests and diseases | Human health | Trade | Political past, conflict

Impact of pests and diseases on agriculture



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Area Crops Affected

Crop Impact Pests

Economic Impact (Cost USD)

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Drought | Human health | Trade | Political past, conflict

Climate Change and Agricultural Pests and Diseases

Climate change will bring a greater risk of pests and diseases to African agricultural systems, affecting crop, livestock, and fisheries productivity.

CROPS

- **Crop pests already account for ~1/6th of farm productivity losses globally**. Climate change is believed to accelerate the prevalence of pests and diseases and increase the occurrence of shock events (Dinesh et al., 2015).
- **Warming trends could lead to the expansion of crop pests** into previously cold-limited areas (Pereira, 2017).

EXAMPLES:

- **African armyworm outbreaks in the region** are frequent and devastating.
- **50-plus years of data on the native African armyworm** shows that the population explodes after periods of drought (Becktold, 2017).
- **The Fall armyworm, endemic to North and South America, was first identified in Africa in 2016, in Nigeria**. The pest has since spread to more than 28 African countries and destroyed more than 300,000 ha of maize, the staple food for more than 200 million Africans (Becktold, 2017).
- **Global warming** induced drought conditions may have enabled the Fall armyworm's rapid spread across the continent.
- **In 2014, Fall armyworm outbreaks were reported in Mozambique, eastern Zambia and Malawi**, where 2,600 ha of crops were affected and over 500 ha completely destroyed, according to reports from the Ministry of Agriculture (New Humanitarian, 2014).
- **In Zimbabwe, the World Food Programme estimated that 2.2 million people required food assistance**, as more than 800 ha of cereal grain crops and 300 ha of pasture were destroyed by Fall armyworm (New Humanitarian, 2014).
- **By February 2017, the Fall armyworm outbreak in Malawi had affected 382,000 ha of maize, sorghum, and millet nationwide**, impacting more than 1 million farm families (Keeton, 2018).
- Reports from the **Zambia Disaster Management and Mitigation Unit** indicated that as of January 2017, close to **130,000 ha of maize had been affected by a severe outbreak of the Fall armyworm** (Reliefweb, 2017).
- Subsequent **food shortages in Malawi affected 1.85 million** people, according to the Malawi Vulnerability Assessment Committee (MVAC). The country was simultaneously plagued by outbreaks of red locusts, mainly around Lake Chiuta and Lake Chilwa near the border with Mozambique (New Humanitarian, 2014).
- **Controlling the brown locust costs the South African taxpayer millions of Rands annually**. The outbreak in 1985–1986 cost over R50 million to control (equivalent to USD 25 million at the time), while the more recent outbreak in 1995–1996 cost approximately R14 million (USD 3.5 million) (Price and Brown, 2000).

FIND OUT MORE:

UNFCCC agreements | Cyclones and flooding | Drought | Human health | Trade | Political past, conflict

Climate Change and Agricultural Pests and Diseases

LIVESTOCK

- **Climate change** can impact livestock in **four key areas** namely, pests and diseases, water availability, heat stress and the quality and quantity of feed (Pereira, 2017).
- Climate change can exacerbate disease in livestock, and some diseases are especially sensitive to climate change.
- Of the **65 animal diseases identified as most significant to poor people, 58 % are climate sensitive** and will exacerbate under favouring weather conditions (Dinesh et al., 2015).
- There is clear evidence that some emergent livestock diseases have already expanded in range because of climate change.
- **Meta-analyses suggest that around 20% of ruminants in Africa and more than 50% of poultry die prematurely** each year, and case studies indicate at least half of deaths are due to infectious disease (Dinesh et al., 2015).

EXAMPLES:

- **Foot and Mouth Disease (FMD)** has a devastating effect on the economies of Southern African countries.
- **Migration** is practiced by a large proportion of African pastoralists in response to drought. This can lead to disease transferral.
- With the **2003 FMD outbreak, Zimbabwe lost millions** of dollars in potential beef exports. The commercial herd dropped from about 1.4 million in 2000 to 250,000 head of cattle leaving the country's beef industry, previously a backbone of the agriculture-based economy, threatened with collapse. The Cattle Producers Association estimated that up to USD 20m would be needed to fight the disease over the next two years (Bafana, 2003).
- **In 2004, FMD in Zambia resulted in losses in income of over USD 1.6 billion** from restrictions on exports of beef and sable antelopes and an annual cost of over USD 2.7 million on preventive measures. It is estimated that the Zambian Government spends over USD 2.7 million annually on procuring vaccines and conducting and monitoring vaccination campaigns (Sinkala et al., 2014).
- **In 2015, there was an outbreak of FMD in the north of Namibia**. It was the worst case in 40 years (Prinsloo, 2019). The outbreak spread to over three regions in less than five months. A total of 14 regions in the Northern Communal Areas reported FMD cases from January to June 2015. It eventually cost about USD 13 million to control (Prinsloo, 2019).
- **Milk losses affected cattle and goats**, with two-thirds of households in a randomised survey losing the capacity to sell milk as a result of FMD outbreaks (Prinsloo, 2019).
- The same proportion were affected by loss of livestock traction due to FMD induced lameness.
- **FMD was rated as the most important disease for agro-pastoralist losses in Namibia** (Prinsloo, 2019).

Photo: Apollo Habtamu (ILRI)

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Climate Change and Agricultural Pests and Diseases

AQUACULTURE

- **Aquaculture operations in the tropics experience higher cumulative mortalities and faster progression of diseases**. This could be exacerbated by climate change (Dinesh et al., 2015).

- As aquaculture species farmed for human consumption are poikilothermic, changes in **ambient temperature related to climate change could weaken their immune systems** thereby increasing their susceptibility to diseases.

- Additionally, **extreme weather events have the potential to transmit disease across wide geographies** (Dinesh et al., 2015).

EXAMPLES:

- **Epizootic ulcerative syndrome (EUS) found in fish since 2007 in Botswana, Namibia and Zambia is climate sensitive**. EUS occurs in natural freshwater systems and extreme weather events such as flooding can distribute it over thousands of kilometres. The spread of EUS up and downstream of the Zambezi River is a strong possibility and this would put the livelihoods of several million people in seven countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe) at risk (Dinesh et al., 2015).

Photo: Duangphorn Wiriya-unsplash

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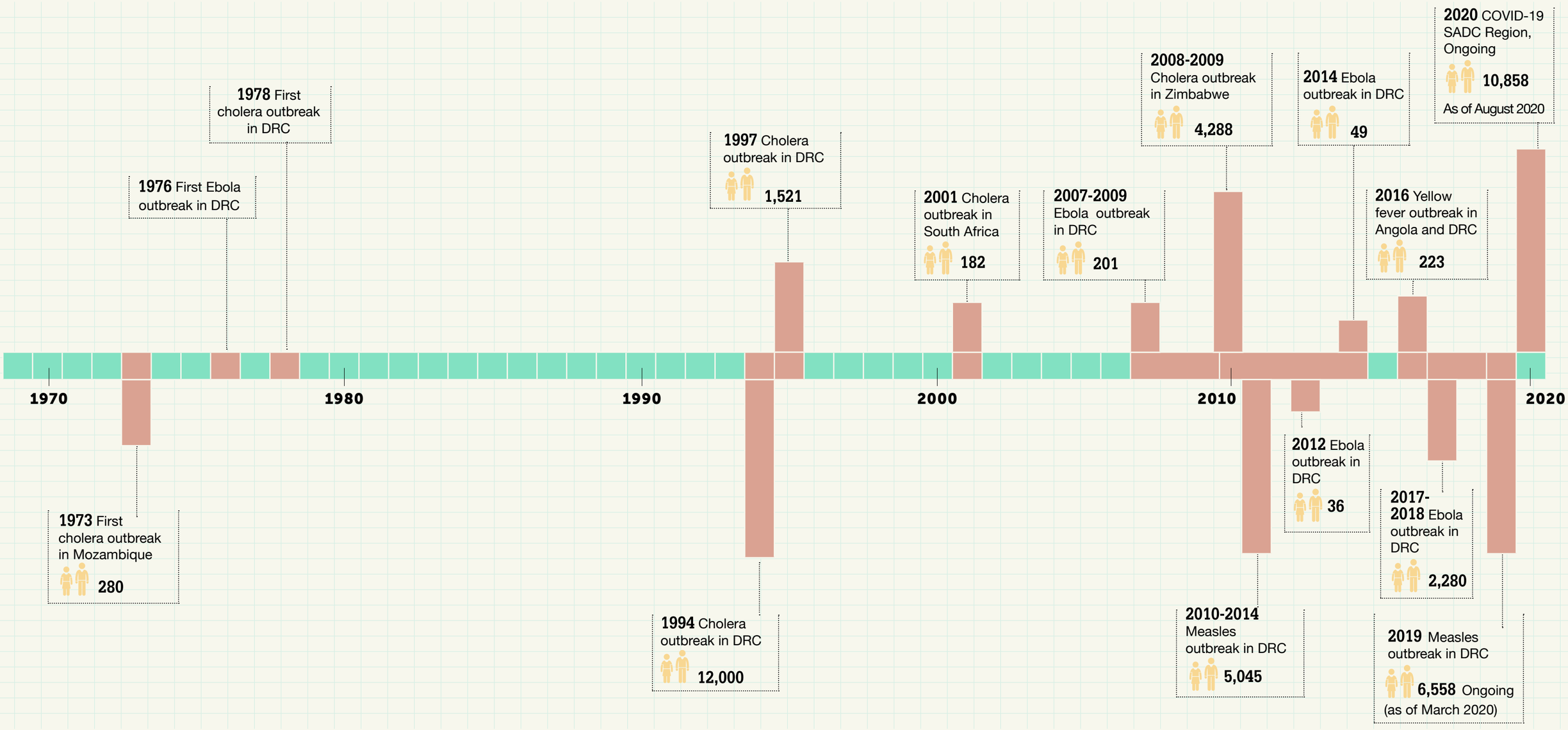
Climate change and human health



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Human Impact
lives lost

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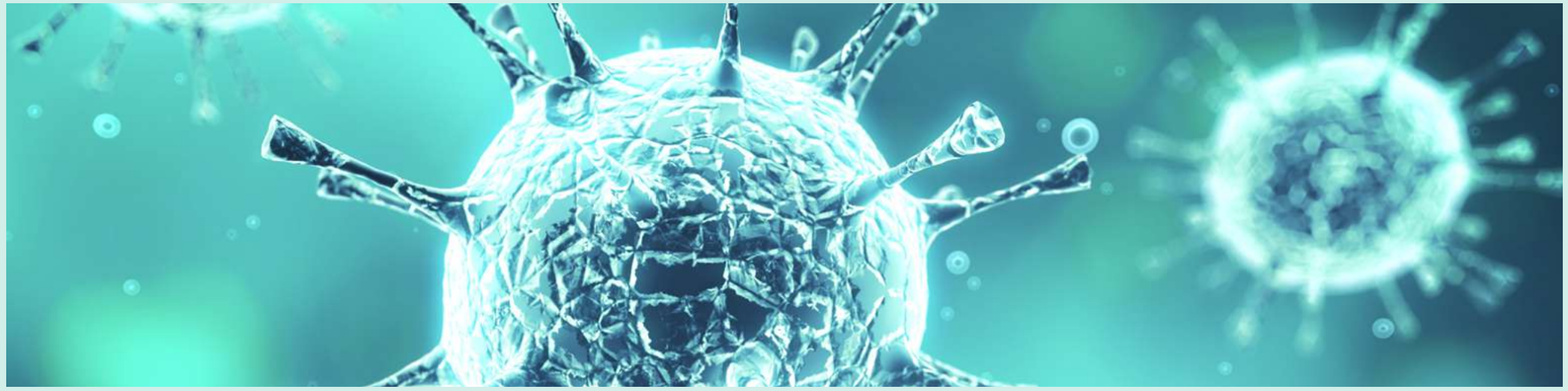
Climate Change and Human Health

- **Climate change has both direct and indirect impacts on human health**. Direct impacts include injury, morbidity and mortality caused by climate change-related extreme weather events (such as cyclones); thermal stress (heat waves and cold periods); skin and eye damage (as a result of UV radiation) and cardio-respiratory diseases related to changes in temperature and air quality. Indirect impacts include malnutrition, tropical diseases, diarrhoea, malaria and meningitis (ACPC, 2013).
- **Flooding provides breeding grounds for insects** and causes water contamination, leading to the spread of vector-borne and diarrheal diseases like cholera.
- **Droughts and floods affect crop yields resulting in food insecurity** and malnutrition thereby lowering immunity and enhancing the vulnerability of affected communities.
- **Studies have shown that people suffering from food insecurity are at a higher risk for infectious** and noncommunicable diseases and have poorer health outcomes. Once a disease has been acquired, a cycle of food insecurity and poor health begins (Kelly et al., 2018).
- **Food shortages can force poverty-stricken people to consume alternative foods such as bushmeat**. According to USAID, "nearly 75% of all new, emerging, or re-emerging diseases affecting humans at the beginning of the 21st Century are zoonotic" — meaning they originate in animals. Such diseases include AIDS, SARS, H5N1 avian flu, H1N1 flu and presently, COVID-19.
- Furthermore, as the **human population grows in the region (2017-2018, SADC population grew by 2.5% to 345.2 million people (SADC, 2018))**, wildlife vectors that may have carried diseases without effect for years, are more frequently coming into contact with humans as their habitats are destroyed e.g. through agriculture expansion.
- **Underdeveloped countries typical to Southern Africa, are more vulnerable to infectious disease** as the people are unable to protect themselves with adequate nutrition, housing, infrastructure, education, a sound health system, access to vaccines and surveillance systems that track cases of disease (Cho, 2014).



EXAMPLES:

Cholera

- Cholera, caused by the bacterium Vibrio cholerae, has frequently emerged in Southern Africa over the past 50 years. Epidemics are almost annual in frequency.
- Overpopulation, poverty, lack of hygiene, poor sanitation facilities, contamination of food and a lack of clean potable water are the main risk factors for cholera outbreaks.
- In July 1994, one of the worst cholera epidemics broke out among Rwandan refugees in Goma, eastern DRC. The United Nations High Commission for Refugees estimated that nearly 12,000 people died during the epidemic (Siddique, 1994).
- In 2006, cholera was reported in 33 African countries; 88% of reports came from conflict-affected countries (Fenollar and Mediannikov, 2018).
- One of the most severe outbreaks of cholera was observed in Zimbabwe, with 98,585 reported cases including more than 4,000 deaths from 2008 to 2009 (Fenollar and Mediannikov, 2018).

Ebola

- The Ebola virus was first discovered in September 1976 in DRC.
- Almost 50% of Ebola outbreaks have been directly linked to bushmeat consumption and handling.
- In DRC, new outbreaks still occur regularly, such as the two declared in 2018 (Fenollar and Mediannikov, 2018).

Plague

- Plague (Yersinia pestis) has been involved in several pandemics. It still causes epidemics in Africa.
- In 2017, more than 200 people died from the disease in Madagascar (Fenollar and Mediannikov, 2018).

COVID-19

- As with Ebola, COVID-19 is believed to originate in wild bats (Guo et al., 2019).
- The COVID-19 pandemic will likely cause a food security crisis in Africa, with agricultural production potentially contracting between 2.6% and 7% (Hall, 2020).
- Food imports could also decline substantially (13%-25%) further compounding food insecurity, due to a combination of higher transaction costs and a reduced domestic demand (lack of income) (Hall, 2020).

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Political past and conflict

1964-1974 Mozambique War of Independence

1975-1991 First period of Angolan Civil War

1978-1979 Tanzania-Uganda War
100,000-500,000

1972-1980 Rhodesian Bush War
>20,000

1983-1987 Gukurahundi-Zimbabwe National Army massacres Ndebele people in Matabeleland
20,000

1992-1994 Resurgence of Angolan Civil War

1996-1997 First Congo War, civil war in DRC
3.5 million

1998-2002 Resurgence of Angolan Civil War
500,000
Over the three periods of civil war, 1975-2002

1998-2003 Second Congo War (DRC)
5.4 million

2013-2019 Mozambique RENAMO Insurgency

2016-2018 Conflict in Kasai region of DRC

1970 — 1990 — 2010 — 2020

1975 Mozambique, Angola and Comoros gain independence

1976 Seychelles gains independence

1977-1992 Mozambican Civil War
>1 million

1980 Zimbabwe gains independence

1994 End of Apartheid in South Africa

2000 Rejection of revised constitution in Zimbabwe, political conflict

2008 Political violence peaks in Zimbabwe with presidential elections

2017-present Mozambique ongoing Islamist insurgency in Cabo Delgado province
>1,100 Ongoing 2020

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Political Past, Conflict and Agriculture

- **Oppressive, colonial pasts have resulted in weak state institutions**, flawed legislative systems and constant struggles for political power to the detriment of the well being of many African nations (Ongayo, 2008).

- **Most countries in Southern Africa gained independence prior to 1970**. However, a few (Mozambique, Angola, Seychelles, Comoros and Zimbabwe) gained theirs between 1975 and 1980.

- **Africa's politics are famous for instability with military coups, genocides and civil wars**. Arguably, the countries with the most turbulent pasts in Southern Africa include Angola, Mozambique, Zimbabwe, DRC and South Africa. With conflict ongoing in Mozambique and DRC and continued political instability in Zimbabwe.

- **In these conflict-affected countries, most livelihoods constitute smallholder farming**. These households face a high degree of income uncertainty even in the absence of conflict, primarily due to changing weather patterns. Furthermore, some are commodity suppliers to local, domestic or global markets and so are subject to price fluctuations. Conflict presents an additional "shock" that affects the already insecure livelihoods and well being of these populations.

- **Agriculture production tends to drop substantially in regions affected by conflict**, due to adverse effects on labour supply, access to land and access to credit and/or direct effects on capital such as theft and destruction (Charles Martin-Shields and Wolfgang Stojetz, 2018).

- **Food shortages and price increases are often perceived as due to poor governance** and can result in a breakdown of state authority (Charles Martin-Shields and Wolfgang Stojetz, 2018).

- Subsequently, **climate change is theorised to indirectly drive conflict in developing countries**, as diminished agricultural yields affect local employment opportunities, incomes, food availability and food prices.

- Additionally, **food insecurity can induce population migration with further potential for conflict** as receiving communities compete for resources and employment e.g. xenophobic attacks in South Africa.

EXAMPLES:

- In **August 1996, the DRC entered a civil war**. The conflict drew in many African forces, such as the Rwandan, Ugandan, and Burundian armies on one side and the Angolan, Zimbabwean, Sudanese, and Namibian armies on the other. The conflict left more than 3.5 million civilians dead (Iyenda, 2005).

- **The Second Congo War broke out in 1998**. Ultimately, nine African countries and around twenty-five armed groups were involved. By 2008, the war and its aftermath had caused 5.4 million deaths, principally through disease and starvation, making the Second Congo War the deadliest conflict worldwide since World War II. Around 2 million people were displaced from their homes or sought asylum in neighbouring countries.

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Photo: Anton Ivanchenko-unsplash

References

1986 Anti-Apartheid Act, (undated). https://blog.smu.edu/theanti-apartheidmovementinnorthtexas/history/1986-anti-apartheid-act/

African Climate Policy Centre (ACPC), (2013). Climate Change and Health in Africa: Issues and Options. Policy Brief, Climate for Development (ClimDev-Africa Programme).

AUDA-NEPAD, (2001). Interactive Timeline. https://www.nepad.org/history.

AUDA-NEPAD, (2019). Overview: CAADP. https://www.nepad.org/caadp/overview.

Bafana, B., (2003). Foot and mouth disease in Zimbabwe. New Agriculturist Online. http://www.new-ag.info/03-5/develop/dev02.html.

Becktold, W., (2017). Fall Armyworm Arrives in Africa on the Heels of Climate Change. A rapidly spreading invasive pest now threatens crops across the continent. https://www.sierraclub.org/sierra/fall-armyworm-arrives-africa-heels-climate-change.

Biteye, M. and Songwe, C., (2018). African Trade Agreement: Catalyst for Growth, https://www.rockefellerfoundation.org/blog/african-trade-agreement-catalyst-growth/.

Blein, R., Bwalya, M., Chimatiro, S., Faivre-Dupaigre, B., Kisira, S., Leturque, H. and Wambo-Yamdjeu, A., (2013). African agriculture, transformation and outlook. NEPAD, 72 p.

Cho, R., (2014). How Climate Change Is Exacerbating the Spread of Disease. Earth Institute, Columbia University. https://blogs.ei.columbia.edu/2014/09/04/how-climate-change-is-exacerbating-the-spread-of-disease/.

COMESA, (2019). Overview of COMESA. https://www.comesa.int/overview-of-comesa/.

Davis-Reddy, C.L. and Vincent, K., (2017). Climate Risk and Vulnerability: A Handbook for Southern Africa (2nd Ed), CSIR, Pretoria, South Africa.

Dinesh, D., Bett, B., Boone, R., Grace, D., Kinyangi, J., Lindahl, J., Mohan, C., Ramirez-Villegas, J., Robinson, T., Rosenstock, T., Smith, J. and Thornton, P., (2015). Impact of climate change on African agriculture: focus on pests and diseases Findings from CCAFS submissions to the UNFCCC SBSTA.

European Commission, (2019). Southern African Development Community (SADC), https://ec.europa.eu/trade/policy/countries-and-regions/regions/sadc/.

Fenollar, F. and Mediannikov, O., (2018). Emerging infectious diseases in Africa in the 21st century. New Microbe and New Infect; 26: S10–S18.

Guo, Y., Cao, Q., Hong, Z., Tan, Y., Chen, S., Jin, H., Tan, K., Wang, D. and Yan, Y., (2019). The origin, transmission and clinical therapies on coronavirus disease (COVID-19) outbreak – an update on the status. Military Medical Research (2020) 7:11.

Hall, B., (2020). Coronavirus and the Implications for Food Systems and Policy. Agrilinks. https://www.agrilinks.org/post/coronavirus-and-implications-food-systems-and-policy

Iyenda, G., (2005). Civil war and lootings in the Congo: how the poor pay the bill. African Journal on Conflict Resolution. Vol. 5 (2): pp. 7-32.

Keeton, K., (2018). Malawi's new reality: Fall armyworm is here to stay. IFPRI Blog. https://www.ifpri.org/blog/malawis-new-reality-fall-armyworm-here-stay.

Kinsey, B., Burger, K. and Gunning, J.W., (1998). Coping with drought in Zimbabwe: Survey evidence on responses of rural households to risk. World Development. Vol. 26, pp. 89-110.

Lukamba, M.T., (2010). Natural disasters in African countries: what can we learn about them? The Journal for Transdisciplinary Research in Southern Africa, 6 (2), pp. 478 – 495.

Martin-Shields, C. and Wolfgang S., (2018). Food security and conflict: Empirical challenges and future opportunities for

References

research and policy making on food security and conflict. FAO Agricultural Development Economics Working Paper 18-04.

New Humanitarian, (2014). Crop-eating pests plague southern African farmers. https://www.thenewhumanitarian.org/news/2014/02/07/crop-eating-pests-plague-southern-african-farmers

Ongayo, A., (2008). Political instability in Africa: Where the problem lies and alternative perspectives. The African Diaspora Policy Centre, Amsterdam.

Pereira, L., (2017). Climate Change Impacts on Agriculture across Africa. Oxford Research Encyclopaedia of Environmental Science. Oxford University Press USA.

Price, R.E. and Brown, H.D., (2000). A Century of Locust Control in South Africa. Ch 4. Workshop on Research Priorities for Migrant Pests of Agriculture in Southern Africa, Plant Protection Research Institute, Pretoria, South Africa, 24–26 March 1999.R. A. Cheke, L. J. Rosenberg and M. E. Kieser (eds) (2000) Natural Resources Institute, Chatham, UK.

Prinsloo, T., (2019). Lessons from Namibia on curbing the spread of foot and mouth disease. University of Pretoria. https://theconversation.com/lessons-from-namibia-on-curbing-the-spread-of-foot-and-mouth-disease-109838.

Reliefweb, (2017). Southern Africa: Armyworm Infestation - Jan 2017. https://reliefweb.int/disaster/2017-000019-zmb.

SADC, (2012). Protocol on Trade (1996), https://www.sadc.int/documents-publications/show/Protocol_on_Trade1996.pdf.

SADC, (2016). Regional situation update on the El Nino-induced drought.

SADC, (2017). SADC for increased Intra-regional and international trade, https://www.sadc.int/news-events/news/sadc-increased-intra-regional-and-international-trade/.

SARDC, (2018). SADC Energy Monitor: Enabling Industrialization and Regional Integration in SADC.

Schoemaker, P.J.H., (2020). How historical analysis can enrich scenario planning. Futures and Foresight Science. 00: pp. 1-13.

Siddique, A.K., (1994). Cholera epidemic among Rwandan refugees: experience of ICDDR, B in Goma, Zaire. Glimpse. 1994; 16(5): 3-4.

Sinkala, Y., Simuunza, M., Pfeiffer, D.U., Munang'andu, H.M., Mulumba, M., Kasanga, C.J., Muma, J.B. and Mweene, A.S., (2014). Challenges and Economic Implications in the Control of Foot and Mouth Disease in Sub-Saharan Africa: Lessons from the Zambian Experience. Veterinary Medicine International.

South African History Online, (1993). The UN lifts mandatory sanctions against SA, https://www.sahistory.org.za/dated-event/un-lifts-mandatory-sanctions-against-sa.

TRALAC, (2020). African Continental Free Trade Area (AfCFTA) Legal Texts and Policy Documents. https://www.tralac.org/resources/our-resources/6730-continental-free-trade-area-cfta.html.

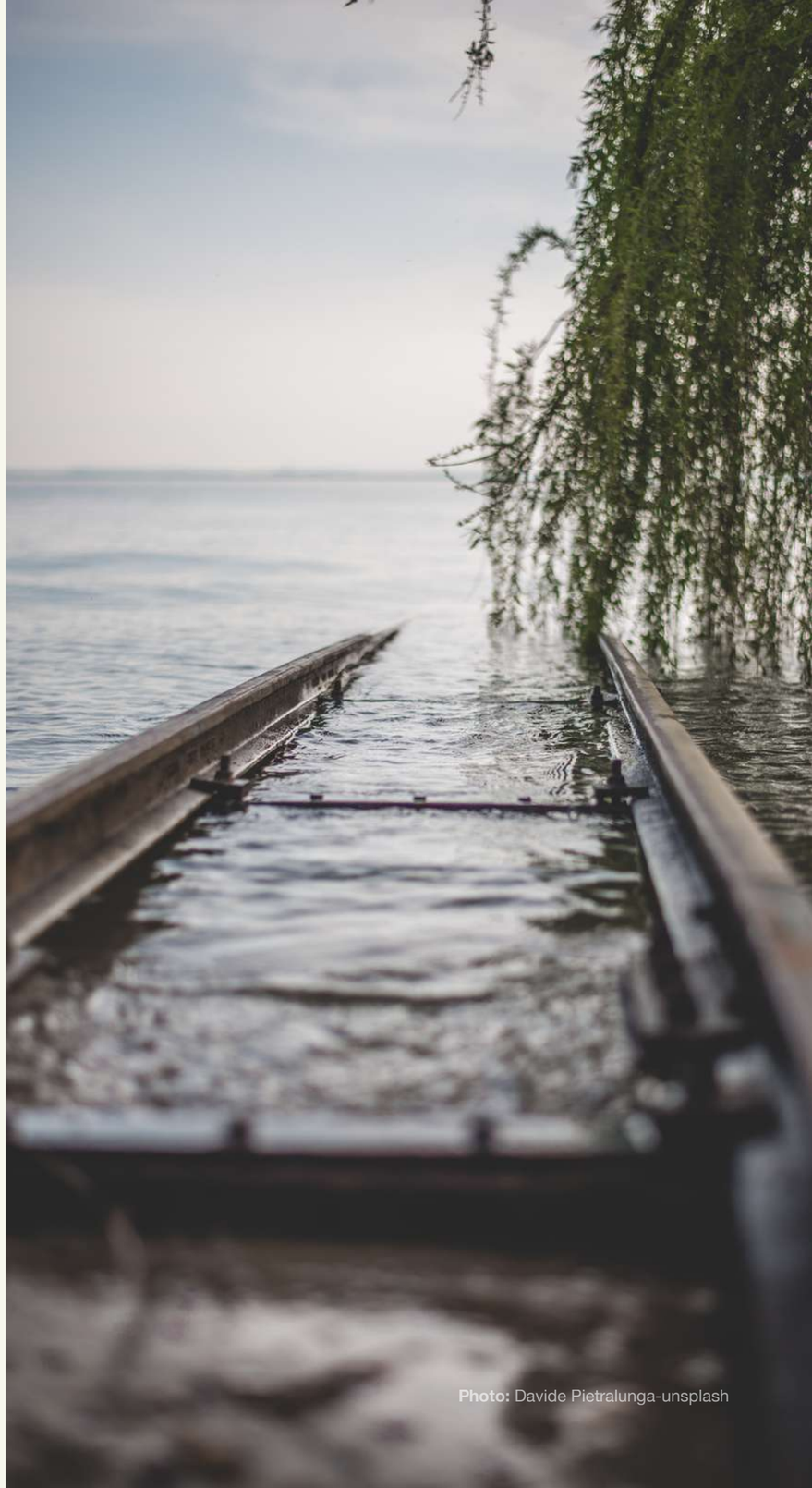
UNFCCC, (undated). UNFCCC -- 25 Years of Effort and Achievement: Key Milestones in the Evolution of International Climate Policy, https://unfccc.int/timeline/.

UNFCCC, (2020). National Adaptation Plans, https://unfccc.int/topics/adaptation-and-resilience/workstreams/national-adaptation-plans

UNFCCC, (2020). The Paris Agreement and NDCs, https://unfccc.int/nationally-determined-contributions-ndcs.

UNFCCC, (2020). What is the United Nations Framework Convention on Climate Change? https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change.

Unicef, (2019), Cyclone Idai and Kenneth Cause Devastation and Suffering in Mozambique, https://www.unicef.org/mozambique/en/cyclone-idai-and-Kenneth.



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